



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/571,869	01/19/2007	Johann Riegel	10191/4215	6930
26646 7590 08/18/2010 KENYON & KENYON LLP ONE BROADWAY NEW YORK, NY 10004				
EXAMINER DINH, BACH T				
ART UNIT		PAPER NUMBER		
1795				
MAIL DATE		DELIVERY MODE		
08/18/2010		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/571,869

**Applicant(s)**

RIEGEL ET AL.

**Examiner**

BACH T. DINH

**Art Unit**

1795

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 July 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 10-22 is/are pending in the application.
- 4a) Of the above claim(s) 12-14, 19 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10, 11, 15-18, 21 and 22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 January 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 03/14/2006; 11/20/2008
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Summary***

1. This is the response to the communication filed on 07/15/2010.
2. Claims 10-22 remain pending in the application. Claims 12-14 and 19-20 are withdrawn in light of Applicant's election to prosecute claims 10-11, 15-18 and 21-22.

### ***Election/Restrictions***

3. Applicant's election with traverse of species B in the reply filed on 07/15/2010 is acknowledged. The traversal is on the ground(s) that electrodes 12 and 32 are separated by the insulation layer 14; therefore, they cannot form the concentration cell. This is not found persuasive because one with ordinary skill would clearly recognize that the concentration cell measures the difference in pressure or the electromotive force generated between two electrodes, which does not require the flow of current between the electrodes. Therefore, the insulating layer 14 would not stop the measurement of electromotive force between the electrodes and preventing the electrodes 12 and 32 from functioning as a concentration cell.

The requirement is still deemed proper and is therefore made FINAL.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:  

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
5. Claims 10-11, 15-18 and 21-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention. Claim 10 recites the first electrode together with the reference electrode forms a concentration cell. Furthermore, claim 10 also recites the second electrode functions as a reference electrode of the same concentration cell; therefore, absent clear direction from the originally filed specification, it is unclear as to how the gas sensor would operate in a concentration cell with two reference electrodes. Furthermore, the originally filed specification fails to explicitly disclose a concentration cell having two reference electrodes.

Claims 11, 15-18 and 21-22 are rejected as dependents of claim 10.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 10-11 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Heimann et al. (US 2004/0040846).

Addressing claims 10-11, Heimann discloses a sensor element for a gas sensor 10 (figures 3-4):

A pair of first electrode 33 and second electrode 31;

A solid electrolyte (layers 21-24), with solid electrolyte portion 21 disposed between the first and second electrodes; therefore, the solid electrolyte layer 21, the electrodes 31 and 33 are capable of forming the pump cell;

A reference electrode 34 provided on the solid electrolyte and exposed to reference gas [0019];

A porous protective layer 35 or the coarsely porous diffusion layer covers the first electrode 33; additionally, the electrodes 33 and 34 are connected by the solid electrolyte layers 21-23; therefore, the electrodes 33 and 34 are capable of forming a concentration cell; and

A finely porous diffusion layer 51 coated on a surface of the second electrode 31; furthermore, the electrode 31 is connected to the electrodes 33 and 34 via the solid electrolyte layers; therefore, the second electrode 31 is capable of functioning as the reference electrode of the concentration cell.

Applicant is respectfully reminded that the apparatus claims must be structurally distinguishable from the prior art in terms of structure rather than function (Please see MPEP 2114). In instant situation, Heimann discloses all of the required structures of the claimed apparatus; therefore, the disclosure of Heimann anticipates the claimed apparatus.

Addressing claim 15, in figure 3 of Heimann, the layer 21 is the first solid electrolyte layer and the layer 23 is the second solid electrolyte layer with the electrodes 33 and 31 situated vertically on opposite sides of the first solid electrolyte layer 23. Furthermore, the space 41 is the clearance between the second solid electrolyte layer 23 and the finely porous diffusion layer 51 and the clearance being exposed to a gas mixture via a gas supply orifice 43 that extends through the first solid electrolyte layer 21.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heimann et al. (US 2004/0040846) in view of Fukuda et al. (US 4,808,293).

Addressing claims 16-17, Heimann discloses the layer 22 is a solid electrolyte layer [0019] supporting the first solid electrolyte layer 21.

Heimann is silent regarding the layer 22 comprises a radial web in the area of the clearance.

Fukuda discloses a gas sensor comprises a layer 2 in form of a radial web for supporting the top layer 3 and is disposed on the solid electrolyte layer 1 (figures 3-4).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the solid electrolyte layer 22 of Heimann with the radial web section

as disclosed by Fukuda because the radial web portion would increase the diffusion flow resistance; thereby, allowing the oxygen sensor to operate at a lower temperature (Fukuda, 4:21-25).

11. Claims 10-11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al. (US 4,579,643 or '643) in view of Usami et al. (US 4,902,400).

Addressing claims 10-11, Mase '643 discloses a sensor element for a gas sensor (figure 2), comprising:

A pair of first electrode 22 and second electrode 12;

A solid electrolyte layer (layers 2, 4 and 6, col. 6 lines 35-39 or 6:35-39) disposed between the first and second electrodes; therefore, the solid electrolyte layer 2 with the electrodes 22 and 12 are capable of forming the pump cell;

A reference electrode 18 provided on the solid electrolyte layer 6 and exposed to a reference gas (6:42-47);

The electrodes 22 and 18 are connected by the solid electrolyte layers 2, 4 and 6; therefore, they are capable of forming the concentration cell; additionally, the electrodes 12, 22 and 18 are connected by the solid electrolyte layers 2, 4 and 6; therefore, the electrode 12 is capable of functioning as the reference electrode of the concentration cell. Applicant is respectfully reminded that the apparatus claims must be structurally distinguishable from the prior art in terms of structure rather than function (Please see MPEP 2114). In instant situation, the electrodes of Mase '643 are capable of performing the function as recited by current claims.

In another embodiment, Mase '643 discloses porous protective layer 144 for the outer electrode 140 and porous protective layer 146 for the inner electrode 142 (figure 8).

Mase '643 is silent regarding the porous protective layer and the finely porous protective layer disposed in the manner as required by current claims.

Usami discloses a gas sensor comprises a porous protective layer 41 covers the outer electrode 41 and a porous protective layer 38 covers the inner electrode 6 (figure 2).

Additionally, the porous protective layer 38 is disposed in a manner that clearance exists between the solid electrolyte layer 10 and the porous protective layer (figure 2).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor in figure 2 of Mase '643 with the porous protective layers 41 and 38 for covering the outer electrode 22 and inner electrode 12, respectively, in the manner disclosed by Usami in figure 2 because the porous protective layers would improve the durability of the electrodes (Usami, 8:58-64) as intended by Mase '643 (Mase, 14:24-37). In the modified gas sensor of Mase '643, the porous protective layer that covers the first electrode 22 is the coarsely porous diffusion layer and the porous protective layer that covers the second electrode 12 is the finely porous diffusion layer.

Addressing claim 15, in figure 2, Mase '643 discloses the layer 2 is the first solid electrolyte layer and layer 4 is the second solid electrolyte layer; the first 22 and second 12 electrodes are disposed on opposite surfaces of the first solid electrolyte layer 2. Furthermore, the aperture 14 is the claimed gas supply orifice.



In figure 2, Usami discloses a clearance exists between the porous protective layer 38 and the solid electrolyte layer 10 and a gas supply orifice 50.

Therefore, in the modified gas sensor of Mase '643 in view of Usami, the same clearance would exist between the porous protective layer of the second electrode and the second solid electrolyte layer.

12. Claims 18 and 21 rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al. (US 4,579,643 or '643) in view of Usami et al. (US 4,902,400) as applied to claims 10-11 and 15 above, and further in view of Mase et al. (US 4,755,274 or '274).

Addressing claims 18 and 21, Usami is silent regarding the finely porous diffusion layer is made up of a plurality of superposed diffusion layers of different porosities.

Mase '274 discloses a gas sensor comprises a porous diffusion layer that covers the inner electrode 112 (figure 21); wherein, the porous diffusion layer comprises two layers 108a and 108b with different porosities (16:58-61).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Mase '643 with the porous diffusion layer with multiple superposed layers as disclosed by Mase '274 as the finely porous diffusion layer covering the second electrode because the multiple superposed diffusion layers would either increase the sharpness of detection of a variation in output or reducing the tendency of plugging or clogging (Mase '274, 15:52-16:5).

13. Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al. (US 4,579,643 or '643) in view of Usami et al. (US 4,902,400) as applied to claims 10-11 and 15 above, and further in view of Fukuda et al. (US 4,808,293).

Addressing claims 16-17, Mase '643 discloses the solid electrolyte layer 4 disposed between the layers 2 and 6 (figure 2).

Mase '643 is silent regarding the layer 4 comprises a radial web in the area of the clearance.

Fukuda discloses a gas sensor comprises a layer 2 in form of a radial web for supporting the top layer 3 and is disposed on the solid electrolyte layer 1 (figures 3-4).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the solid electrolyte layer 4 of Mase '643 with the radial web section as disclosed by Fukuda because the radial web portion would increase the diffusion flow resistance; thereby, allowing the oxygen sensor to operate at a lower temperature (Fukuda, 4:21-25).

14. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al. (US 4,579,643 or '643) in view of Usami et al. (US 4,902,400) and Fukuda et al. (US 4,808,293) as applied to claims 16-17 above, and further in view of Mase et al. (US 4,755,274 or '274).

Addressing claim 22, Usami is silent regarding the finely porous diffusion layer is made up of a plurality of superposed diffusion layers of different porosities.

Mase '274 discloses a gas sensor comprises a porous diffusion layer that covers the inner electrode 112 (figure 21); wherein, the porous diffusion layer comprises two layers 108a and 108b with different porosities (16:58-61).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Mase '643 with the porous diffusion layer with multiple superposed layers as disclosed by Mase '274 as the finely porous diffusion layer covering the second electrode because the multiple superposed diffusion layers would either increase the sharpness of detection of a variation in output or reducing the tendency of plugging or clogging (Mase '274, 15:52-16:5).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BACH T. DINH whose telephone number is (571)270-5118. The examiner can normally be reached on Monday-Friday EST 7:00 A.M-3:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571)272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/  
Supervisory Patent Examiner, Art Unit 1753

BD  
08/13/2010